PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-332478

(43)Date of publication of application : 18.12.1998

(51)Int.Cl. G01J 1/02
G01J 5/08

(21)Application number : 09-136319

(22)Date of filing : 27.05.1997

(71)Applicant : FUJITSU LTD

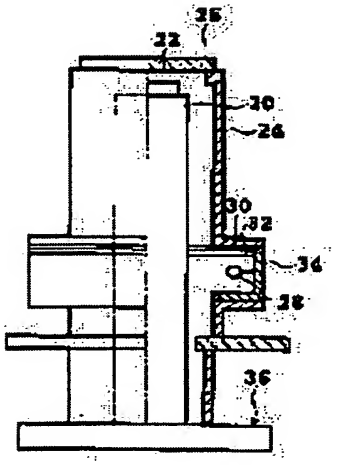
(72)Inventor : GOTO JUNJIRO
ITO MICHIHARU

(54) INFRARED DETECTOR AND MANUFACTURE THEREOF

(57)Abstract:

PROBLEM TO BE SOLVED: To make it possible to pick up a high quality image without causing any damage on the performance of a detector or malfunction by interposing a filter which passes gas but does not pass a solid substance, e.g. powdery dust, between a getter and an infrared detection element.

SOLUTION: When a space defined by inner and outer cylinders 20, 24 is evacuated, gas in that space is passed through a filter 30 and adsorbed by a getter 28 thus sustaining the vacuum state. When the getter 28 is subjected to vibration or impact, the getter 28 is crushed to generate powdery dust of about several tens μm, but the powdery dust is blocked by the filter 30 and not spread to an infrared detection element 22. Consequently, the powdery dust does not traverse the light receiving face of the infrared detection element 22 at the time of picking up the image and no pseudo signal appears on the image. When the filter 30 is sandwiched by supporting plates 32 having gas passing holes and the inner cylinder 20 is set in a cut made in the filter 30 and the supporting plates 32, the infrared detector is protected against damage due to vibration, impact, or the like.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The container liner which carried the infrared detecting element in the end face, and the outer case which prepared the optical aperture in the location which is arranged around this container liner and counters this infrared detecting element, It is the infrared detector characterized by preparing the filter which does not pass solid-states, such as dust, although a gas is passed between said getters and said infrared detecting elements in the infrared detector which has a getter for maintaining the vacua of the space formed with said container liner and said outer case.
[Claim 2] The infrared detector according to claim 1 which considers as the sandwich structure inserted with the support plate of a couple with which the hole for gas passage opened said filter, and is characterized by having arranged said container liner in the deficit section prepared in this filter and this support plate.
[Claim 3] Said filter and said support plate are an infrared detector according to claim 2 characterized by being estranged and arranged from said container liner.
[Claim 4] Said filter is an infrared detector according to claim 1 characterized by consisting of ingredients with few gas evolutions which do not cause degree of vacuum degradation.
[Claim 5] Said support plate is an infrared detector according to claim 2 characterized by inserting in the screw thread turned off on the side face, and being fixed to an outer case.
[Claim 6] The step which produces the container liner with which it is supported by the plinth and an infrared detecting element is carried in an end face, The step which produces the getter case which attached the getter in the interior, Although it has the 2nd deficit section to the step which produces the outer case which prepared the optical aperture in the end face, the support plate of the couple which has the 1st deficit section to the part to which said container liner is arranged, and the part to which said container liner is arranged, and is inserted into this support plate and a gas is passed The step which produces the diaphragm of sandwich structure with the filter which does not pass solid-states, such as dust, The manufacture approach of the infrared detector characterized by including the step which carries out airtight junction of the step which carries out airtight junction of the step which attaches said diaphragm, and said plinth and said getter case, and said getter case and said outer case in said getter case or said outer case.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the manufacture approach of an infrared detector and an infrared detector.
[0002]
[Description of the Prior Art] An infrared detector is a sensor which detects the electromagnetic wave of the wavelength of an infrared band with a wavelength of 2-15 micrometers by the infrared detecting element formed with mixed crystal, such as Hg1-x Cdx Te. An infrared detecting element carries out crystal growth of Hg1-x Cdx Te etc. to substrates, such as sapphire, and forms the contact electrode of a couple in the both sides on the front face of main, and the thing of the photoconduction mold which uses an inter-electrode field as an infrared light sensing portion is known.
[0003] This kind of infrared detecting element is used in the condition of having cooled even to about 77K liquid nitrogen extent, in order to pull out that engine performance to the maximum extent. For this reason, in a common infrared detector, an infrared detecting element is held in that vacuum tooth-space side using the vaccum insulated vessel of the Dewar structure.
[0004] drawing 6 -- some conventional infrared detectors -- it is a cross-section side elevation. As shown in this drawing, the infrared detector has the Dewar structure where the container liner 2 was held in the interior of the outer case 16 with which welding of the optical apertures (germanium etc.) 18 was carried out so that the incidence of the infrared radiation could be carried out to a top face.
[0005] A container liner 2 consists of insulators, such as glass, an infrared detecting element 14 is arranged in the top face which counters the optical aperture 18, the circuit pattern 4 connected with an infrared detecting element 14 is formed in a side face, and the circuit pattern 4 and the signal pin 8 on a ceramic substrate 6 are connected by the wire 10.
[0006] The exhaust pipe which is not illustrated is formed and evacuation is carried out for the space formed by this exhaust pipe with a container liner 2 and an outer case 16. However, if an infrared detecting element 14 is processed at the temperature of about 100 degrees C or more, since the engine performance will completely deteriorate, in the container, the getter 12 for bleedoff gas adsorption is usually attached for degree of vacuum maintenance.
[0007]
[Problem(s) to be Solved by the Invention] By the way, although the shape of a pumice which sintered Zr, V, Fe, etc. with a divisor of 10 micrometers of a getter 12 is porous, if an oscillation, an impact, etc. are added at the time of apparatus mounting and employment, sometimes a part of this sintered compact will break, the dust which is the divisor of 10 micrometers will be generated, and it will fly about the inside of a vacuum housing.
[0008] This smashed dust crossed the light-receiving side of an infrared detecting element 14 at the time of an image pick-up, consequently appeared as a false signal in the image, and had the problem of infrared image pick-up equipment malfunctioning.
[0009] This invention is made in view of such a point, and it aims at offering the infrared detector and its manufacture approach for enabling a quality image pick-up [be / no malfunction], without spoiling the engine performance also in the infrared detector in which the getter was attached.
[0010]
[Means for Solving the Problem] Drawing 1 is principle drawing of this invention. The container

liner 20 which carried the infrared detecting element 22 in the end face as shown in this drawing, In the infrared detector which has the getter 28 for maintaining the vacua of the space formed with the outer case 24 which formed the optical aperture 26 in the location which is arranged around a container liner 20 and counters an infrared detecting element 22, and a container liner 20 and an outer case 24 Although a gas is passed between a getter 28 and an infrared detecting element 22, solid-states, such as dust, are characterized by forming the filter 30 which is not passed.
[0011] Since invention was constituted as mentioned above, if the space formed with a container liner 20 and an outer case 24 will be in a vacua, the gas in this space passes a filter 30, and a getter 28 will adsorb this gas and will maintain a vacua.
[0012] If a getter 28 gets an oscillation, an impact, etc., a getter will break, dust with a divisor of 10 micrometers will be generated, but since a filter 30 prevents this dust, dust does not reach an infrared detecting element 22. Therefore, it is lost that dust crosses the light-receiving side of an infrared detecting element 14 at the time of an image pick-up, and appears as a false signal in an image like before.
[0013] For example, it considers as the sandwich structure inserted with the support plate 32 with which the hole for gas passage opened the filter 30, and a container liner 20 is arranged in the deficit section prepared in the filter 30 and the support plate 32. It becomes without it seeming that it damages even if a filter 30 is supported by the support plate 34 and gets an oscillation, an impact, etc. by this.
[0014] Moreover, as for a filter 30 and a support plate 32, estranging and arranging from a container liner 20 is desirable. In the case of the structure where a container liner 20 is cooled and used, this does not spoil the cooling property of a container liner 20.
[0015] Moreover, as for a filter 30, it is still more desirable to constitute from an ingredient with few gas evolutions which do not cause degree of vacuum degradation. A support plate 32 is good to set the screw thread turned off on the side face, and to fix. Since it sticks to a container easily, is fixed to it and a support plate 32 can prevent generating of a clearance by this, fines dust, such as a getter 28, does not reach an infrared detecting element 22 from a clearance.
[0016] The step which produces the container liner 20 with which the manufacture approach of the infrared detector of this invention is supported by the plinth 36, and an infrared detecting element 22 is carried in an end face, The step which produces the getter case 34 which attached the getter 28 in the interior, Although it has the 2nd deficit section to the step which produces the outer case 24 which formed the optical aperture 26 in the end face, the support plate 32 of the couple which has the 1st deficit section to the part to which a container liner 20 is arranged, and the part to which a container liner 20 is arranged, and is inserted into a support plate 32 and a gas is passed The step which produces the diaphragm of sandwich structure with the filter 30 which does not pass solid-states, such as dust, The step which carries out airtight junction of the step which carries out airtight junction of the step which attaches a diaphragm, and a plinth 36 and the getter case 34, and the getter case 34 and an outer case 24 is included in the getter case 34 or an outer case 24.
[0017]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.
(a) some infrared detectors according [the structural drawing 2 of an infrared detector] to the operation gestalt of this invention -- it is a cross-section side elevation.
[0018] As shown in this drawing, the infrared detector has the Dewar structure which has arranged the outer case 70 around [in which the infrared detecting elements 51, such as Hg1-x Cdx Te, were carried] a container liner 50.
[0019] A container liner 50 consists of insulators, such as glass, and the circuit pattern 52 is formed on the front face in which an infrared detecting element 51 is carried, and the side face. The circuit pattern 52 and the signal pin 60 arranged on a ceramic substrate 56 are electrically connected by the wire 58.
[0020] The getter case 62 inserts the hole of the pars basilaris ossis occipitalis in a container liner 50 from the upper part, is arranged, and is joined to the plinth 54 by airtight welding etc. The getter 64 is attached from the side face of the getter case 62.
[0021] The shape of a pumice which sintered Zr, V, Fe, etc. of a getter 64 is porous. An exhaust pipe

68 is inserted from opening of the side face of the getter case 62, and is joined to the getter case 62 by welding etc.
[0022] The metal cylinder 69 is inserted between a container liner 50 and an outer case 70, and is joined to the base of the getter case 62. The metal cylinder 69 is for carrying out heat cutoff of the temperature T1 of the wall surface of an outer case 70, and the skin temperature T2 of a container liner 50, and consists of covar etc.
[0023] A diaphragm 66 isolates a getter 64 and an infrared detecting element 51, prevents passage of the dust of a getter 64 etc., and that what is necessary is just to be between a getter 64 and an infrared detecting element 51, although the getter case 62 or an outer case 70 may be and the installation location may shift, it makes it the structure attached in the getter case 62 by this example. Therefore, the screw thread is turned off inside the upper side attachment wall of the getter case 62.
[0024] The screw thread is turned off on the side face, this screw thread bites and is put together on the screw thread of getter case 62 side attachment wall, and the diaphragm 66 is being fixed also to the diaphragm 66 by the getter case 62.
[0025] It is required that it should satisfy not making the fines dust of the getter 64 which disperses in a container arriving at the light-receiving side of an infrared detector 51, and the cooling section of a container liner 50 carrying out heat cutoff thoroughly, and making it a diaphragm 66 not spoil a cooling property, that it is the thing of a gas evolution which does not make vacuum degradation cause few, that it is a cheap thing, holding the uniform degree of vacuum in a container semipermanently, etc.
[0026] Drawing 3 is the perspective view of the diaphragm 66 in drawing 2 . As shown in this drawing, a diaphragm 66 is the sandwich structure into which the filter 80 was inserted by the support plate 82 of a couple. a filter 80 -- a core -- the outer diameter of the metal cylinder 69 -- an outline -- although the hole of an equal path passes gases, such as an aperture and bleedoff gas, dust with a divisor [used as the source of release of a false signal] of 10 micrometers etc. is "an ingredient which has molecular sieve structure" along which it does not pass, for example, is the film sheet (trade name: Millipore filter) of the fluorine system resin which the hole below divisor mum opened to homogeneity by about 500 micrometers in thickness at the whole.
[0027] a support plate 82 supports a filter 80 and a screw turns it off on a side face -- having -- **** -- a core -- the outer diameter of the metal cylinder 69 -- an outline -- the hole of an equal path -- the bore of an aperture and the getter case 62 -- an outline -- it has an equal outer diameter and constitutes from covar with a thickness of several [about] mm which the hole of several mmphi opened [disc-like] etc.
[0028] and inner circumference resembled the metal cylinder 69, and the periphery resembled the diaphragm 66 like [the side-attachment-wall side of the getter case 62], and it is stuck, it is estranged, is located and is in the condition that heat cutoff was carried out thoroughly from the container liner 50 with the cooling section of a container liner 50.
[0029] The outer case 70 is joined by airtight welding etc. on the top face of the getter case 62. Welding of the optical aperture 72 which consists of germanium etc. so that the incidence of the infrared radiation can be carried out is carried out to the top face of an outer case 70.
[0030] Hereafter, explanation of the infrared detector of drawing 2 of operation is given. An infrared detector is closed after carrying out evacuation from an exhaust pipe 68. The bleedoff gas which occurs after the vacuum lock of the infrared detector is carried out lets the hole and filter 80 of a support plate 82 in drawing 3 pass, a getter 64 is adsorbed, and whenever [high vacuum / of the space formed with a container liner 50 and an outer case 70] is maintained.
[0031] At the time of the activity of this infrared detector, cooling systems, such as a joule Thompson style cooling system, are inserted inside the container liner 50, or it is filled up with cooling media, such as liquid nitrogen, and an infrared detecting element 51 is cooled at low temperature.
[0032] Since heat cutoff is carried out for the temperature T1 of the wall surface of an outer case 70, and the skin temperature T2 of a container liner 50 by the metal cylinder 69 at this time, the cooling effect of a container liner 50 is not spoiled. And since a diaphragm 66 is located in the outside of this metal cylinder 69, it does not spoil the cooling property of this container liner 50.
[0033] And where an infrared detecting element 51 is cooled at low temperature, if the suitable bias

current for an infrared detecting element 51 is given, the image processing of the voltage signal according to the reinforcement of the infrared radiation which received light will be taken out and carried out to external equipment from the signal pin 60.

[0034] By the way, although some sintered compacts of a getter 64 break and the dust of the magnitude which is the divisor of 10 micrometers disperses this infrared detector in response to an oscillation, an impact, etc. from the exterior at the time of apparatus mounting and employment, since a filter 80 prevents passage of the dust of magnitude with a divisor of 10 micrometers, it does not arrive at the direction of an infrared detecting element 51.

[0035] It is lost that dust crosses the light-receiving side of an infrared detecting element 51 at the time of an image pick-up, and appears as a false signal in an image like before by this. Moreover, since there are few gas evolutions, as for a diaphragm 66, vacuum degradation of the infrared detector after a hermetic seal cannot take place easily, either.

[0036] (b) Manufacture approach drawing 4 and drawing 5 of an infrared detector are process drawing showing the manufacture approach of the infrared detector of drawing 2 . Hereafter, the manufacture approach of the infrared detector by the operation gestalt of this invention is explained, referring to these drawings.

[0037] As shown in drawing 4 (a), the tubed container liner 50 which becomes the plinth 54 which attached the ceramic substrate 60 which has the circuit pattern which is not illustrated and the signal pin 60 from insulators, such as glass, is welded.

[0038] it is shown in drawing 4 (b) -- as -- the top face and side face of glass -- a conductor -- after forming a metal membrane by technique, such as vacuum deposition, it is processed into the desired circuit pattern 52 with laser light. Next, in order to connect the signal pin 60 and a circuit pattern 52, after carrying out wirebonding of the wire 58, an infrared detecting element 51 is carried in the top face of a container liner 50.

[0039] As shown in drawing 5 (a), the hole of predetermined magnitude is made in the base on which a container liner 50 is inserted, the metal cylinder 69 is fixed to a base, it ****s to the inner surface of a side attachment wall, 86 is cut, and the getter case 62 of the shape of a cylinder which inserted installation and an exhaust pipe 68 from the side attachment wall, and welded the getter 64 is produced from a side attachment wall.

[0040] As shown in drawing 5 (b), a diaphragm 66 is fixed to the getter case 62 in the location which was cut to the peripheral face of the diaphragm 66 of the structure shown in drawing 3 and whose top face of a diaphragm 66 ****s, and inserts 84 in the screw thread 86 of the getter case 62, for example, corresponds with the top face of the getter case 62.

[0041] As shown in drawing 5 (c), the outer case 70 which welded the optical apertures 72, such as germanium, to the top face is joined to the top face of the getter case 62 by airtight welding. Heating an outer case 70 etc. at 95 degrees C - about 100 degrees C, and making gas emit, from an exhaust pipe 68, evacuation is carried out even to 10-8Torr extent, and an exhaust pipe 68 is closed. And bias current is passed to a getter 64, it is activated to it, and production of the infrared detector shown in drawing 2 is ended.

[0042] Since according to the operation gestalt explained above a diaphragm 66 separates a getter 64 and an infrared detecting element 51 and the passage to the infrared detecting element 51 of dust with a divisor of 10 micrometers is prevented with the filter 80 of this diaphragm 66, dust does not arrive at the direction of an infrared detecting element 51, and it is lost that dust crosses the light-receiving side of an infrared detecting element at the time of an image pick-up, and appears as a false signal in an image like before.

[0043]

[Effect of the Invention] Since according to this invention a diaphragm separates a getter and an infrared detecting element and the passage to the infrared detecting element of dust with a divisor of 10 micrometers can be prevented as explained above, dust does not arrive at the direction of an infrared detecting element, and like before, dust can cross the light-receiving side of an infrared detecting element at the time of an image pick-up, and can prevent appearing as a false signal in an image.

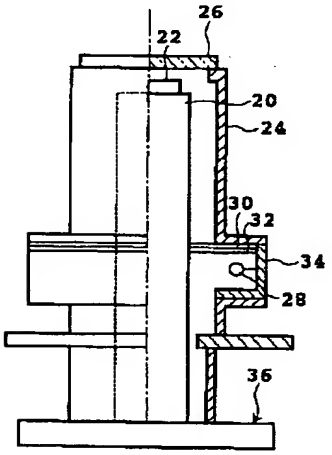
[Translation done.]

* NOTICES *

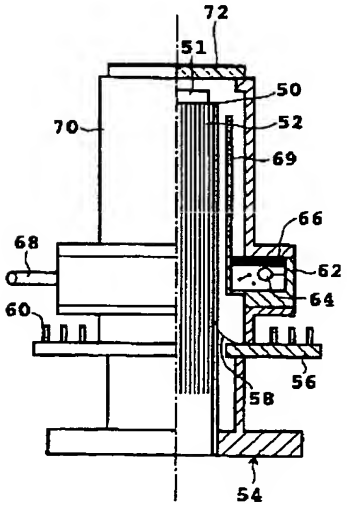
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]
本発明の原理図

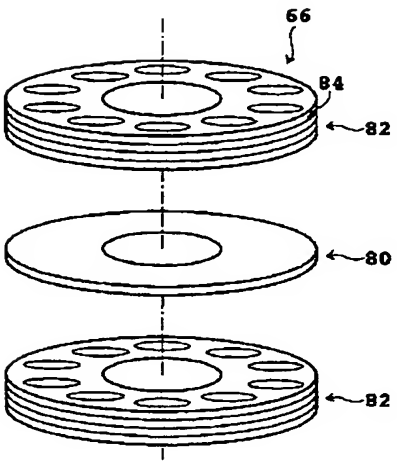


[Drawing 2]
本発明の実施形態による赤外線検知器



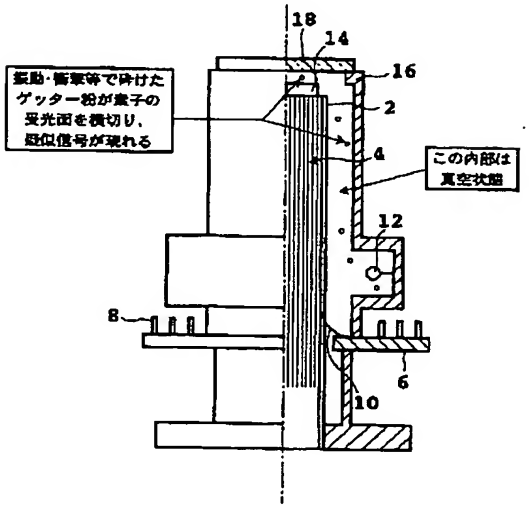
[Drawing 3]

図２中の仕切り板



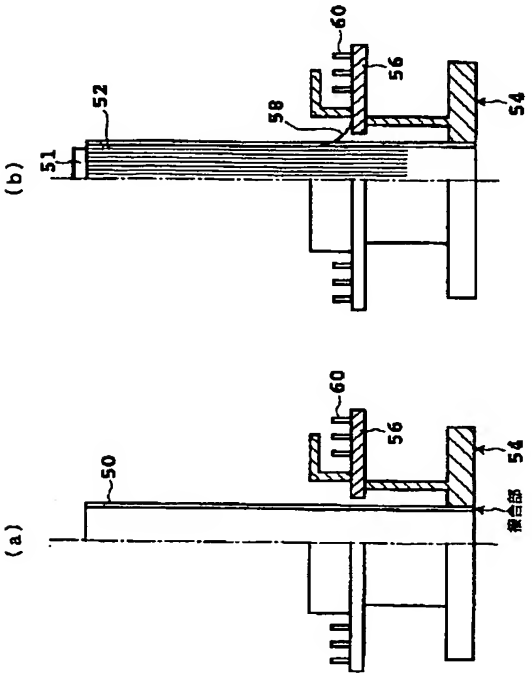
[Drawing 6]

従来の赤外線検知器



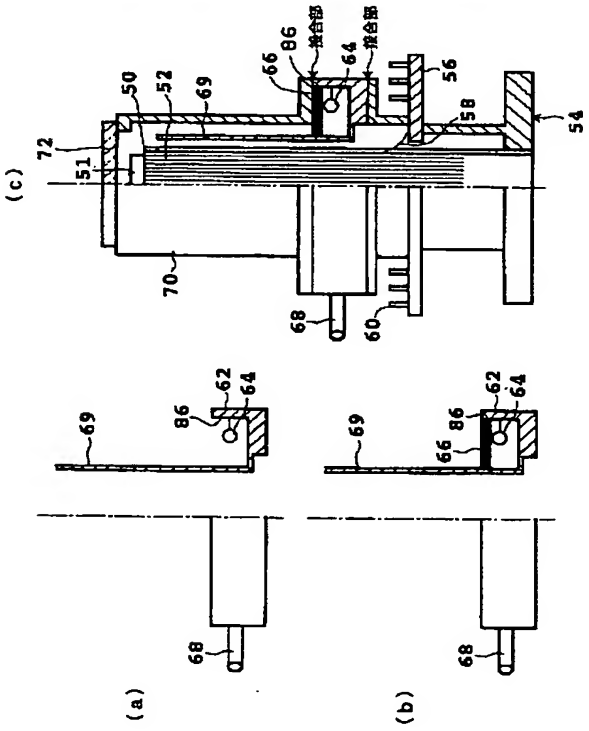
[Drawing 4]

本発明の実施形態による赤外線検知器の製造方法



[Drawing 5]

本発明の実施形態による赤外線検知器の製造方法



[Translation done.]

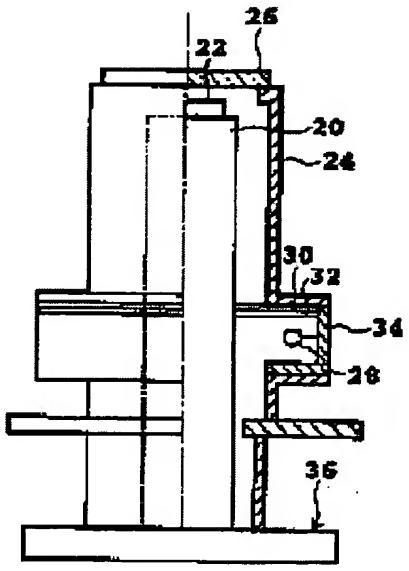
INFRARED DETECTOR AND MANUFACTURE THEREOF

Patent number:	JP10332478
Publication date:	1998-12-18
Inventor:	GOTO JUNJIRO; ITO MICHIHARU
Applicant:	FUJITSU LTD
Classification:	
- international:	G01J1/02; G01J5/08
- european:	
Application number:	JP19970136319 19970527
Priority number(s):	

Abstract of **JP10332478**

PROBLEM TO BE SOLVED: To make it possible to pick up a high quality image without causing any damage on the performance of a detector or malfunction by interposing a filter which passes gas but does not pass a solid substance, e.g. powdery dust, between a getter and an infrared detection element.

SOLUTION: When a space defined by inner and outer cylinders 20, 24 is evacuated, gas in that space is passed through a filter 30 and adsorbed by a getter 28 thus sustaining the vacuum state. When the getter 28 is subjected to vibration or impact, the getter 28 is crushed to generate powdery dust of about several tens &mu m, but the powdery dust is blocked by the filter 30 and not spread to an infrared detection element 22. Consequently, the powdery dust does not traverse the light receiving face of the infrared detection element 22 at the time of picking up the image and no pseudo signal appears on the image. When the filter 30 is sandwiched by supporting plates 32 having gas passing holes and the inner cylinder 20 is set in a cut made in the filter 30 and the supporting plates 32, the infrared detector is protected against damage due to vibration, impact, or the like.



(19)日本国特許庁（ＪＰ）　(12) 公開特許公報（A）　(11)特許出願公開番号

特開平10－332478

(43)公開日　平成10年(1998)12月18日

(51)Int.Cl.[6]	識別記号	ＦＩ	
Ｇ０１Ｊ　1/02		Ｇ０１Ｊ　1/02	Ｃ
5/08		5/08	Ｆ

審査請求　未請求　請求項の数６　ＯＬ　（全 ６ 頁）

(21)出願番号　特願平9－136319

(22)出願日　平成９年(1997)５月27日

(71)出願人　000005223
富士通株式会社
神奈川県川崎市中原区上小田中４丁目１番１号

(72)発明者　後藤　純二郎
神奈川県川崎市中原区上小田中４丁目１番１号　富士通株式会社内

(72)発明者　伊藤　道春
神奈川県川崎市中原区上小田中４丁目１番１号　富士通株式会社内

(74)代理人　弁理士　松本　昂

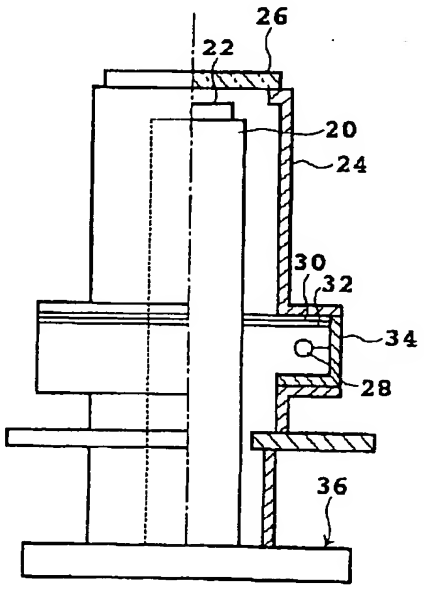
(54)【発明の名称】　赤外線検知器及びその製造方法

(57)【要約】

【課題】　ゲッターが取り付けられた赤外線検知器でもその性能を損なうことなく、誤動作なく高品質な撮像を可能にするための赤外線検知器及びその製造方法を提供することを目的とする。

【解決手段】　端面に赤外線検知素子を搭載した内筒と、内筒の周囲に配置され、赤外線検知素子に対向する位置に光学窓を設けた外筒と、内筒と外筒とにより郭成される空間の真空状態を維持するためのゲッターとを有する赤外線検知器において、ゲッターと赤外線検知素子との間に、気体は通過するが、粉塵等の固体は通過させないフィルタを具備して構成する。

本発明の原理図



1

【特許請求の範囲】

【請求項１】　端面に赤外線検知素子を搭載した内筒と、該内筒の周囲に配置され、該赤外線検知素子に対向する位置に光学窓を設けた外筒と、前記内筒と前記外筒とにより画成される空間の真空状態を維持するためのゲッターとを有する赤外線検知器において、

前記ゲッターと前記赤外線検知素子との間に、気体は通過するが、粉塵等の固体は通過させないフィルタを設けたことを特徴とする赤外線検知器。

【請求項２】　前記フィルタを気体通過用の穴が開いた一対の支持板で挟んだサンドイッチ構造とし、該フィルタ及び該支持板に設けた欠損部に前記内筒を配置したことを特徴とする請求項１記載の赤外線検知器。

【請求項３】　前記フィルタ及び前記支持板は、前記内筒から離間して配置されていることを特徴とする請求項２記載の赤外線検知器。

【請求項４】　前記フィルタは、真空度劣化を起こさないガス放出の少ない材料で構成されていることを特徴とする請求項１記載の赤外線検知器。

【請求項５】　前記支持板は、その側面に切ったねじを嵌め合わせて外筒に固定されていることを特徴とする請求項２記載の赤外線検知器。

【請求項６】　台座に支持され、端面に赤外線検知素子が搭載される内筒を作製するステップと、

ゲッターを内部に取り付けたゲッターケースを作製するステップと、

端面に光学窓を設けた外筒を作製するステップと、

前記内筒が配置される部位に第１欠損部を有する一対の支持板と、前記内筒が配置される部位に第２欠損部を有し、該支持板に挟まれ、気体は通過させるが、粉塵等の固体は通過させないフィルタとのサンドイッチ構造の仕切り板を作製するステップと、

前記ゲッターケース又は前記外筒に前記仕切り板を取り付けるステップと、

前記台座と前記ゲッターケースとを気密接合するステップと、

前記ゲッターケースと前記外筒とを気密接合するステップと、

を含むことを特徴とする赤外線検知器の製造方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、赤外線検知器及び赤外線検知器の製造方法に関するものである。

【０００２】

【従来の技術】赤外線検知器は、波長２～１５μｍの赤外線帯域の波長の電磁波を$Hg_{1-x}Cd_xTe$などの混晶で形成される赤外線検知素子により検知するセンサである。赤外線検知素子は、サファイアなどの基板に$Hg_{1-x}Cd_xTe$などを結晶成長させて、主表面の両側に一対のコンタクト電極を形成し、電極間の領域を赤外線受光部とする光伝導型のものが知られている。

2

【０００３】この種の赤外線検知素子は、その性能を最大限に引き出すために、７７Ｋ程度の液体窒素程度にまで冷却した状態で使用される。このため、一般的な赤外線検知器では、デュア構造の真空断熱容器を用い、その真空スペース側に赤外線検知素子を収容する。

【０００４】図６は、従来の赤外線検知器の一部断面側面図である。この図に示すように、赤外線検知器は、上面に赤外線が入射できるように光学窓（Ｇｅなど）１８が融着された外筒１６の内部に、内筒２が収容されたデュア構造となっている。

【０００５】内筒２は、ガラスなどの絶縁体からなり、光学窓１８に対向する上面には赤外線検知素子１４を配置し、側面には、赤外線検知素子１４と接続される配線パターン４が形成され、配線パターン４とセラミック基板６上の信号ピン８とがワイヤ１０により接続されている。

【０００６】図示しない排気管が設けられており、この排気管により内筒２と外筒１６とで画成される空間を真空排気をするようになっている。しかしながら、赤外線検知素子１４は約１００℃以上の温度で処理してしまうと、その性能が全く劣化してしまうので、通常、真空度維持のために、容器内には放出ガス吸着用のゲッター１２が取り付けられている。

【０００７】

【発明が解決しようとする課題】ところで、ゲッター１２は、約数十μｍのＺｒ、Ｖ、Ｆｅなどを焼結した軽石状のポーラスなものであるが、装置実装時や運用時に振動・衝撃などが加わると、時として、この焼結体の一部が砕け、約数十μｍの粉塵が発生して、真空容器内を飛び回る。

【０００８】この砕けた粉塵は、撮像時に赤外線検知素子１４の受光面を横切り、その結果、映像に疑似信号として現れて、赤外線撮像装置が誤動作するなどの問題があった。

【０００９】本発明は、このような点に鑑みてなされたものであり、ゲッターが取り付けられた赤外線検知器でもその性能を損なうことなく、誤動作なく高品質な撮像を可能にするための赤外線検知器及びその製造方法を提供することを目的としている。

【００１０】

【課題を解決するための手段】図１は本発明の原理図である。この図に示すように、端面に赤外線検知素子２２を搭載した内筒２０と、内筒２０の周囲に配置され、赤外線検知素子２２に対向する位置に光学窓２６を設けた外筒２４と、内筒２０と外筒２４とにより画成される空間の真空状態を維持するためのゲッター２８とを有する赤外線検知器において、ゲッター２８と赤外線検知素子２２との間に、気体は通過するが、粉塵等の固体は通過させないフィルタ３０を設けたことを特徴とする。

【００１１】以上のように発明を構成したので、内筒２０と外筒２４とにより画成される空間が真空状態になると、この空間中のガスがフィルタ３０を通過し、ゲッター２８がこのガスを吸着して、真空状態を維持する。

【００１２】ゲッター２８が振動・衝撃などを受けると、ゲッターが砕けて、約数十μmの粉塵が発生するするが、フィルタ３０がこの粉塵を阻止するので、赤外線検知素子２２には粉塵は届かない。従って、従来のように粉塵が、撮像時に赤外線検知素子１４の受光面を横切り、映像に疑似信号として現れるようなことが無くなる。

【００１３】例えば、フィルタ３０を気体通過用の穴が開いた支持板３２で挟んだサンドイッチ構造とし、フィルタ３０及び支持板３２に設けた欠損部に内筒２０を配置する。これにより、フィルタ３０が支持板３４に支持されて、振動・衝撃などを受けても破損するようなこともなくなる。

【００１４】また、フィルタ３０及び支持板３２は、内筒２０から離間して配置することが望ましい。これにより、内筒２０が冷却されて使用される構造の場合において、内筒２０の冷却特性を損なうことがない。

【００１５】また、フィルタ３０は、真空度劣化を起こさないガス放出の少ない材料で構成することがさらに望ましい。支持板３２は、その側面に切ったねじを合わせて固定するとよい。これにより、支持板３２が容器に容易に密着して固定されて隙間の発生を防止できるため、隙間からゲッター２８などの微粉塵が赤外線検知素子２２に到達することがない。

【００１６】本発明の赤外線検知器の製造方法は、台座３６に支持され、端面に赤外線検知素子２２が搭載される内筒２０を作製するステップと、ゲッター２８を内部に取り付けたゲッターケース３４を作製するステップと、端面に光学窓２６を設けた外筒２４を作製するステップと、内筒２０が配置される部位に第１欠損部を有する一対の支持板３２と、内筒２０が配置される部位に第２欠損部を有し、支持板３２に挟まれ、気体は通過させるが、粉塵等の固体は通過させないフィルタ３０とのサンドイッチ構造の仕切り板を作製するステップと、ゲッターケース３４又は外筒２４に仕切り板を取り付けるステップと、台座３６とゲッターケース３４とを気密接合するステップと、ゲッターケース３４と外筒２４とを気密接合するステップとを含む。

【００１７】

【発明の実施の形態】以下、図面を参照して本発明の実施の形態について説明する。

（ａ）　赤外線検知器の構造

図２は、本発明の実施形態による赤外線検知器の一部断面側面図である。

【００１８】この図に示すように、赤外線検知器は、$Hg_{1-x}Cd_xTe$などの赤外線検知素子５１が搭載された内筒５０の周囲に外筒７０を配置したデュア構造となっている。

【００１９】内筒５０は、ガラスなどの絶縁体からなり、赤外線検知素子５１を搭載する表面及び側面上に配線パターン５２が形成されている。配線パターン５２とセラミック基板５６上に配置した信号ピン６０とがワイヤ５８により電気的に接続されている。

【００２０】ゲッターケース６２は、その底部の穴を上方から内筒５０に挿入して配置され、気密溶接などにより、台座５４に接合されている。ゲッター６４がゲッターケース６２の側面から取り付けられている。

【００２１】ゲッター６４は、Ｚｒ、Ｖ、Ｆｅなどを焼結した軽石状のポーラスなものである。排気管６８は、ゲッターケース６２の側面の開口部から挿入されて、溶接などによりゲッターケース６２に接合されている。

【００２２】金属筒６９が、内筒５０と外筒７０の間に挿入され、ゲッターケース６２の底面に接合されている。金属筒６９は外筒７０の壁面の温度Ｔ１と内筒５０の表面温度Ｔ２とを熱遮断するためのものであり、コバールなどからなる。

【００２３】仕切り板６６は、ゲッター６４と赤外線検知素子５１とを隔離して、ゲッター６４の粉塵などの通過を阻止するものであり、その取り付け位置は、ゲッター６４と赤外線検知素子５１との間であればよく、ゲッターケース６２又は外筒７０のいずれてもよいが、本例では、ゲッターケース６２に取り付ける構造としている。そのために、ゲッターケース６２の上方の側壁の内側には、ねじが切られている。

【００２４】仕切り板６６にも、側面にねじが切られており、このねじがゲッターケース６２側壁のねじに噛み合わさって、仕切り板６６がゲッターケース６２に固定されている。

【００２５】仕切り板６６は、容器内に飛散するゲッター６４の微粉塵を赤外線検出素子５１の受光面に到達させないこと、内筒５０の冷却部とは完全に熱遮断し、冷却特性を損なわないようにすること、ガス放出の少なく真空劣化を起こさせないものであること、安価なものであること、容器内の均一な真空度を半永久的に保持すること、などを満足することが要求される。

【００２６】図３は、図２中の仕切り板６６の斜視図である。この図に示すように、仕切り板６６は、フィルタ８０が一対の支持板８２によって挟まれたサンドイッチ構造である。フィルタ８０は、中心部に金属筒６９の外径に概略等しい径の穴が開き、放出ガスなどの気体は通過するが、疑似信号の発生源となる約数十μmの粉塵などは通らない「分子ふるい構造をした材料」であり、例えば、厚さ約５００μmで約数μm以下の穴が全体に均一に開いたフッソ系樹脂のフィルムシート（商品名：ミリポアフィルタ）である。

【００２７】支持板８２は、フィルタ８０を支持するも

のであり、側面にネジが切られており、中心部に金属筒６９の外径に概略等しい径の穴が開き、ゲッターケース６２の内径に概略等しい外径を有する円盤状のものであり、数ｍｍΦの穴の開いた厚み約数ｍｍのコバールなどで構成する。

【００２８】そして、仕切り板６６は、内周が金属筒６９に、外周がゲッターケース６２の側壁面にに密着しており、内筒５０からは離間して位置し、内筒５０の冷却部とは完全に熱遮断された状態となっている。

【００２９】外筒７０は、気密溶接などにより、ゲッターケース６２の上面で接合されている。外筒７０の上面には、赤外線が入射できるようにＧｅなどからなる光学窓７２が融着されている。

【００３０】以下、図２の赤外線検知器の動作説明をする。赤外線検知器は、排気管６８から真空排気をした後、封止される。赤外線検知器が真空封止されてから発生する放出ガスは、図３中の支持板８２の穴及びフィルタ８０を通して、ゲッター６４に吸着されて、内筒５０と外筒７０とにより画成される空間の高真空度が維持される。

【００３１】この赤外線検知器の使用時には、内筒５０の内側にジュールトムソン式冷却装置などの冷却装置を挿入しておくか、或いは液体窒素などの冷却媒体を充填し、赤外線検知素子５１を低温に冷却する。

【００３２】この時、金属筒６９により、外筒７０の壁面の温度Ｔ１と内筒５０の表面温度Ｔ２とを熱遮断をするので、内筒５０の冷却効果が損なわれない。そして、仕切り板６６は、この金属筒６９の外側に位置するので、この内筒５０の冷却特性を損なうことがない。

【００３３】そして、赤外線検知素子５１を低温に冷却した状態で、赤外線検知素子５１に適当なバイアス電流を与えておくと、受光した赤外線の強度に応じた電圧信号が信号ピン６０から外部の装置に取り出されて、画像処理される。

【００３４】ところで、この赤外線検知器を装置実装時や運用時に外部から振動・衝撃などを受けて、ゲッター６４の焼結体の一部が砕け、約数十μｍの大きさの粉塵が飛散するが、フィルタ８０は、約数十μｍの大きさの粉塵の通過を阻止するので、赤外線検知素子５１の方に到達することはない。

【００３５】これにより、従来のように粉塵が、撮像時に赤外線検知素子５１の受光面を横切り、映像に疑似信号として現れるようなことが無くなる。また、仕切り板６６は、ガス放出が少ないので、気密封止後の赤外線検知器の真空劣化も起こり難い。

【００３６】（ｂ）　赤外線検知器の製造方法

図４及び図５は、図２の赤外線検知器の製造方法を示す工程図である。以下、これらの図を参照しつつ、本発明の実施形態による赤外線検知器の製造方法の説明をする。

【００３７】図４（ａ）に示すように、図示しない配線パターンや信号ピン６０を有するセラミック基板６０を取り付けた台座５４にガラスなどの絶縁体からなる筒状の内筒５０を溶接する。

【００３８】図４（ｂ）に示すように、ガラスの上面及び側面に導体金属膜を蒸着法などの手法により形成した後、レーザー光で所望の配線パターン５２に加工する。次に、信号ピン６０と配線パターン５２とを接続するためにワイヤ５８をワイヤボンディングした後、赤外線検知素子５１を内筒５０の上面に搭載する。

【００３９】図５（ａ）に示すように、内筒５０が挿入される底面に所定の大きさの穴を開け、金属筒６９を底面に固定し、側壁の内面にねじ８６を切り、側壁からゲッター６４を取り付け、排気管６８を側壁から挿入して溶接した円筒状のゲッターケース６２を作製する。

【００４０】図５（ｂ）に示すように、図３に示した構造の仕切り板６６の外周面に切ったねじ８４をゲッターケース６２のねじ８６に嵌め合わせ、例えば、仕切り板６６の上面がゲッターケース６２の上面に一致する位置で、仕切り板６６をゲッターケース６２に固定する。

【００４１】図５（ｃ）に示すように、上面にＧｅなどの光学窓７２を融着した外筒７０をゲッターケース６２の上面に気密溶接によって接合する。外筒７０などを９５℃～１００℃程度に加熱してガスを放出させながら、排気管６８より10^{-8}Ｔｏｒｒ程度にまで、真空排気して、排気管６８を封止する。そして、ゲッター６４にバイアス電流を流して活性化して、図２に示す赤外線検知器の作製を終了する。

【００４２】以上説明した実施形態によれば、ゲッター６４と赤外線検知素子５１とを仕切り板６６により分離し、この仕切り板６６のフィルタ８０によって、約数十μｍの粉塵の赤外線検知素子５１への通過を阻止するので、粉塵が赤外線検知素子５１の方に到達することはなく、従来のように粉塵が、撮像時に赤外線検知素子の受光面を横切り、映像に疑似信号として現れるようなことが無くなる。

【００４３】

【発明の効果】以上説明したように、本発明によれば、ゲッターと赤外線検知素子とを仕切り板により分離するので、約数十μｍの粉塵の赤外線検知素子への通過を阻止できるので、粉塵が赤外線検知素子の方に到達することはなく、従来のように粉塵が、撮像時に赤外線検知素子の受光面を横切り、映像に疑似信号として現れることを防止可能である。

【図面の簡単な説明】

【図１】本発明の原理図である。

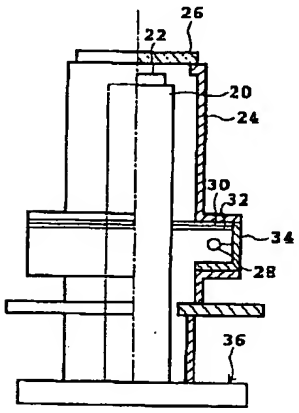
【図２】本発明の実施形態による赤外線検知器の一部断面側面図である。

【図３】図２中の仕切り板の構成図である。

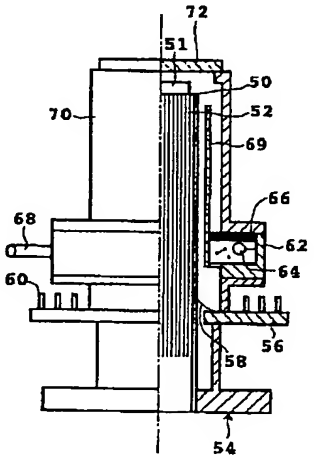
【図４】本発明の実施形態による赤外線検知器の製造方

法を示す工程図である。
【図５】本発明の実施形態による赤外線検知器の製造方法を示す工程図である。
【図６】従来の赤外線検知器の一部断面側面図である。
【符号の説明】
２０　内筒
２２　赤外線検知素子
＊２４　外筒
２６　光学窓
２８　ゲッター
３０　フィルタ
３４　ゲッターケース
３６　台座
＊

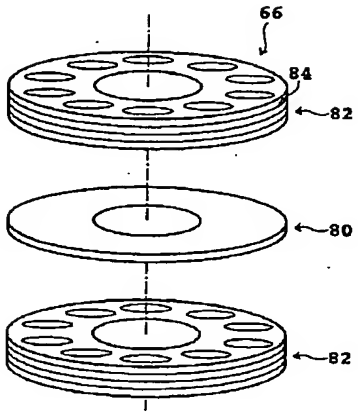
【図１】
本発明の原理図



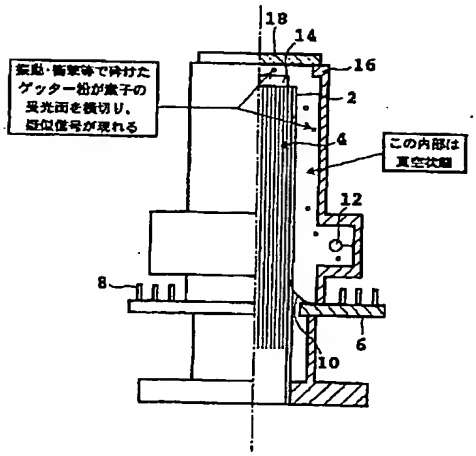
【図２】
本発明の実施形態による赤外線検知器



【図３】
図２中の仕切り板

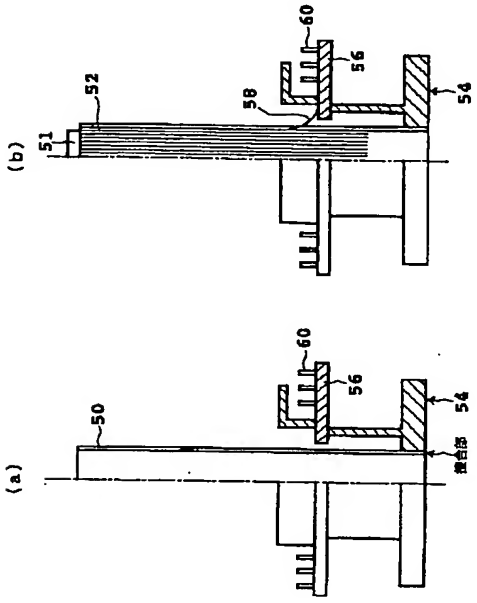


【図６】
従来の赤外線検知器



【図４】

本発明の実施形態による赤外線検知器の製造方法



【図５】

本発明の実施形態による赤外線検知器の製造方法